IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA

CARNEGIE MELLON UNIVERSITY, Plaintiff, v. MARVELL TECHNOLOGY GROUP, LTD., and MARVELL SEMICONDUCTOR, INC., Defendants.	)	Civil Action No. 2:09-cv-00290-NBF

MARVELL'S MEMORANDUM IN SUPPORT OF PARTIAL SUMMARY JUDGMENT OF PATENT INVALIDITY UNDER 35 U.S.C. § 112

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CASES

STATUTES

Defendants Marvell Technology Group, Ltd. and Marvell Semiconductor, Inc. ("Marvell") hereby submit this Memorandum in Support of their Motion for Partial Summary Judgment of Invalidity of U.S. Patent Nos. 6,201,839 ("the '839 patent") (Ex. 1)[1] and 6,438,180 ("the '180 patent") (Ex. 2) (collectively, "the CMU patents") under 35 U.S.C. § 112[2].

I. INTRODUCTION

Based on the Court's prior claim construction ruling regarding the scope of the "selecting" step, including the term "function," claims 1-5 of the '839 patent, and claims 1 and 2 of the '180 patent (herein referred to simply as "the Group I Claims") are invalid for lack of written description under 35 U.S.C. § 112, ¶ 1. In its ruling on Marvell's earlier motion, the Court adopted a claim construction that necessarily invalidates the Group I Claims, as acknowledged in footnote 10 of the Court's Memorandum Opinion (Memo. Op.). Underpinning the Court's ruling was its construction of the claim term "function."

In particular, the Court ruled that "[u]nder this ordinary meaning [of "function"], … simply adding another variable into a function – here the target value – does not operate to convert that single function into multiple functions." Dkt. No. 306 at 16. Given that construction, which is accepted as law of the case, the written description provided in the CMU patents does not disclose any Viterbi detector utilizing a *set* of multiple branch metric functions; consequently, the CMU patents also do not disclose a detector that "selects" a branch metric function from a *set* of multiple branch metric functions, nor any criteria for making such selection. To the contrary, as the Court suggested in its Memo Op. at footnote 10, the only subject matter disclosed by the written description of the CMU patents are Viterbi detectors

[1] As used herein, "Ex. __" refers to exhibits attached to the Declaration of David C. Radulescu, filed herewith.

[2] Marvell also urges that there are additional bases under which the Group I Claims are invalid, as discussed further herein.

based on a design that uses a single branch metric function across different branches of a trellis, *i.e.*, as in conventional Viterbi detectors (albeit with a complicated metric). However, because the claims of the CMU patents recite "selecting" a branch metric function from a *set* of multiple branch metric functions, the claims are not supported by the written description and go beyond what is disclosed. The written description of the CMU patents does not convey with reasonable clarity to those skilled in the art that CMU was in possession of the claimed invention as of the filing date on the patent application. Accordingly, the Group I Claims are invalid pursuant to 35 U.S.C. § 112, ¶ 1, and Marvell is entitled to partial summary judgment of invalidity on those claims.

In addition, CMU is anticipated to argue that a Viterbi detector using the "correlation-sensitive" branch metric (Eqn. 13) described in the CMU patents practices the method recited in the Group I Claims, including the step of "selecting" a branch metric function from a set of different functions. If that is the case, then so does Worstell's detector, and the claims are also invalid under 35 U.S.C. § 102 for being anticipated by the Worstell patent. Indeed, this is expected since both detectors take correlated noise and signal-dependent noise into account by simply providing a modified branch metric for use in an otherwise "conventional" Viterbi detector.

Lastly, the Group I Claims are invalid under 35 U.S.C. § 112, ¶ 2, because the "selecting" step is indefinite in light of the lack of any reference in the Detailed Description of the Invention portion of the CMU patents to the terms "function," "functions," "select," "selecting," "choose" and "choosing," leaving the public to guess as to what the claims cover and do not cover, as evidenced by CMU's own varying interpretation of the scope of its claims in this case.

II. PRIOR PROCEEDINGS

The Court has already ruled that the Group I Claims do not cover the type of Viterbi detectors disclosed in the Worstell patent, but that its claim construction ruling "would seem to render the CMU claims invalid under 35 U.S.C. § 112 ¶ 1." Dkt. No. 306 at 16-17, n.10. That ruling has sparked the instant motion.

Prior to filing the earlier motion, the named inventors and CMU itself asserted that a branch metric equation that included certain "variables" that varied from branch to branch converted that equation into a "set" of branch metric functions. Dkt. No. 249, Marvell SJ Reply Brf. at 5-6; Dkt. No. 251-3, CMU Infringement Contentions at 1; Dkt. No. 251-2, Moura Dep. at 185:2-5 (emphasis added) (the CMU patents "include[s] a **set** of signal-dependent branch metric function**s**."). Relying on that claim interpretation, Marvell filed the earlier motion. Dkt. Nos. 218-222. Marvell argued that if CMU's interpretation were correct, then Worstell's detector must also use a branch metric equation that included a "set" of branch metric functions.[3]

Nonetheless, although the metrics used in Worstell's detectors included the same types of variables that CMU previously asserted converted an equation into a "set" of functions, CMU was forced to change course in responding to the motion. It did so by arguing that only certain types of variables in a branch metric equation can turn that equation into a "set" of functions. CMU referred to that special type of variable as a "parameter" of a function, as opposed to an "input" or "argument."[4] For example, prior to the motion, "target values" that varied from branch to branch were the type of variable that turned a branch metric equation into a "set" of

[3] In particular, Worstell disclosed two different types of branch metrics. The first, referred to as a "modified" metric, took correlation into account and was set forth in Equation 20. The second, referred to as a "further modified" metric, took **both** correlation and signal-dependent noise into account. *See* Sec. IV.E below. Both of these metrics included a number of variables that varied from branch to branch.

[4] The asserted distinction was artificial because the alleged "parameters" were also "inputs" to the metric irrespective of what CMU tried to called them.

functions, but in responding to the motion, they were not, according to CMU. Whatever you call them, there is no dispute that the two branch metrics disclosed in Worstell include the exact same type of variables that are needed to take correlation and/or signal-dependent noise into account. These variables include: the present signal sample, the present target values, the prior noise terms and noise statistics (including the transition noise standard deviation).

Nonetheless, the Court denied the motion. The Court held that the Group I Claims did not cover the type of detectors disclosed in the Worstell patent, in that Worstell's detectors did not satisfy the "selecting" step of the claims, including the "set" of branch metric "functions" requirement. The Court concluded that adding a variable into a function "does not operate to convert that single function into multiple functions." Dkt. No. 306 at 16.

As explained further below, based on the Court's claim interpretation, CMU's "correlation-sensitive" branch metric (Eqn. 13) is not a **set** of branch metric "functions" either, but a **single** branch metric function that includes the same types of variables already disclosed in Worstell, all of which depend on the branch and vary from branch to branch. As such, the Group I Claims do not cover CMU's described detector, in the same way that they do not cover Worstell's. CMU cannot have it both ways. If the claims are interpreted to cover CMU's detector, then they also cover Worstell's, and the claims are also invalid as being anticipated by the Worstell patent.

III. LEGAL STANDARDS

A. Summary Judgment Is an Appropriate Procedural Tool to Invalidate Claims that Are Not Adequately Described by the Specification

Summary judgment may be granted if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to judgment as a matter

of law. Fed. R. Civ. P. 56(c); *Celotex Corp. v. Catrett*, 477 U.S. 317, 325 (1986). "Only disputes over facts that might affect the outcome of the suit under the governing law will properly preclude the entry of summary judgment." *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986). The Federal Circuit has recently acknowledged that "[w]hile '[c]ompliance with the written description requirement is a question of fact,' this issue is 'amenable to summary judgment in cases where no reasonable fact finder could return a verdict for the non-moving party.'" *Atl. Research Mktg. Sys., Inc. v. Troy*, Nos. 2011-1002, 2011-1003, 2011 U.S. App. LEXIS 20208, at *14 (Fed. Cir. Oct. 6, 2011) (published opinion) (quoting *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1307 (Fed Cir. 2008)).[5]

Under 35 U.S.C. § 112, ¶ 1, the specification of a patent must contain a "written description" of the invention in sufficient detail so that the inventor "'convey[s] with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention,' and demonstrate[s] that by disclosure in the specification of the patent." *Carnegie Mellon Univ. v. Hoffman La Roche Inc.*, 541 F.3d 1115, 1122 (Fed. Cir. 2008) (quoting *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991)).[6] "The purpose of the written description requirement 'is to ensure that the scope of the right to exclude, as set forth in the claims, does not overreach the scope of the inventor's contribution to the field of art as described in the patent specification.'" *In re Katz Interactive Call Processing Patent Litig.*, 639 F.3d 1303, 1319 (Fed. Cir. 2011) (citation omitted). Invalidity based on a lack of written description is a

[5] Summary judgment on the basis of lack of written description is routinely granted by district courts. *See, e.g., Trans Video Elec., Ltd. v. Sony Elec., Inc.*, No. C-09-3304 EMC, 2011 U.S. Dist. LEXIS 119031, at *8-23 (Oct. 14, 2011); *Stored Value Solutions, Inc. v. Card Activation Techs, Inc.*, 2011 U.S. Dist. LEXIS 71330, at *60-75 (D. Del. July 1, 2011); *Boston Sci. Corp. v. Johnson & Johnson Inc.*, 679 F. Supp. 2d 539, 554-555 (D. Del. 2010), *aff'd Boston Sci. Corp. v. Johnson & Johnson Inc.*, 647 F.3d 1353 (Fed. Cir. 2011).

[6] As the *Hoffman La Roche* case makes clear, this is not the first time CMU is attempting to assert patent claims not supported by the specification. *Id.*

defense for which the accused infringer has the burden of proof of clear and convincing evidence. *Ariad Pharma, Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1354 (Fed. Cir. 2010) (en banc).

In addition, the written description requirement must be satisfied within the **four corners** of the specification and not by disclosure that makes the invention obvious. *Id.* at 1351 ("[T]he test requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art."); *Regents of the Univ. of California v. Eli Lilly*, 119 F.3d 1559, 1566 (Fed. Cir. 1997), *cert. denied*, 523 U.S. 1089 (1998) ("[A]n applicant complies with the written description requirement 'by describing the invention, **with all its claimed limitations**, **not that which makes it obvious**,' and by using 'such descriptive means as words, structures, figures, diagrams, formulas, etc., that set forth the claimed invention.'") (citing *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997)) (emphasis added).

Indeed, the Federal Circuit has also affirmed the grant of summary judgment based on the written description requirement where the specification was insufficient "**on its face**" to satisfy the written description requirement. *Univ. of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 927 (Fed. Cir. 2004) (describing written description standard and listing cases where a patent was held invalid "on its face" under this standard). Furthermore, the Federal Circuit has invalidated patent claims based solely on the claim construction and the specification. *PIN/NIP, Inc. v. Platte Chem. Co.*, 304 F.3d 1235, 1247-48 (Fed. Cir. 2002). In *PIN/NIP*, the Federal Circuit invalidated patent claims, under the construction uncontested on appeal, to the sequential application of two chemicals, when the specification only disclosed a mixture of the two chemicals. *Id.* The Federal Circuit invalidated the claim by reversing the decision of the trial court on summary judgment that the claim was valid. *Id.*

Claim construction is crucial to the written description requirement. *In re Katz Interactive Call Processing Patent Litig.*, 639 F.3d 1303, 1319 (Fed. Cir. 2011) (holding that "claim construction is inherent in any written description analysis"); *Trans Video Elec., Ltd. v. Sony Elec., Inc.*, No. C-09-3304 EMC, 2011 U.S. Dist. LEXIS 119031, at *13 (N.D. Cal. Oct. 14, 2011) (granting summary judgment of invalidity under the written description requirement and noting that the "decision can turn simply on a claim construction").

B. Claims Amended During Prosecution Must Not Introduce New Matter or the Claims Are Invalid for Lack of Written Description

"One of the roles of the written description requirement is to ensure that patent claims are not amended to claim subject matter different from what was described in the patent application on the date of its filing." *ICN Photonics, Ltd. v. Cynosure, Inc.*, 73 Fed. Appx. 425, 429 (Fed. Cir. 2003); see also 35 U.S.C. §§ 132, 251. Accordingly, "[a]lthough continuing applications can receive the benefit of the earlier-filed application, the parent application must fully support the claims to satisfy the written description requirement." *McKechnie Vehicle Components USA, Inc. v. Lacks Indus., Inc.*, 122 Fed. Appx. 482, 485 (Fed. Cir. 2005) (citing *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1255 (Fed. Cir. 2004)); *see also TurboCare v. Gen. Elec. Co.*, 264 F.3d 1111, 1118 (Fed. Cir. 2001) (noting that when an "applicant adds a claim or otherwise amends his specification after the original filing date, . . . the new claims or other added material must find support in the original specification" to satisfy the written description requirement of 35 U.S.C. § 112, ¶ 1).

IV. ARGUMENT

The Group I claims are invalid under 35 U.S.C. § 112, ¶ 1 because the claims are not supported by the specification, nor does the prosecution history show that the purported invention described by the claims is properly disclosed. There is no genuine dispute of material

fact that would prevent resolving these issues on summary judgment. In addition, based on CMU's arguments in this case, the claims are also invalid under 35 U.S.C. §§ 102 and 112, ¶ 2, as explained further below.

A. The CMU Patent Specifications Do Not Describe a "Set" of Different Branch Metric Functions for Use in a Viterbi Detector as Required by the Group I Claims

The CMU patents simply do not disclose a "set" of different branch metric functions that a detector can choose from in order to determine branch metric values. Under the construction agreed to by the parties, the "selecting" step of the Group I claims require a "set" of branch metric functions to choose from. *See* Revised Joint Claim Construction Chart, Ex. A (Dkt. 120-1) at 3 ("selecting" means "to choose from a set of more than one."). However, the CMU patents do not disclose any Viterbi detector where **more than one** branch metric function is used in the detector. *See* the Declaration of John Proakis, Ph.D. ("Proakis Decl.") submitted herewith at ¶¶ 18-21 and 41-53. Under the Court's construction, the only Viterbi detectors disclosed in the CMU patents are designs that use a single branch metric function across different branches of a trellis. *Id.* The Group I claims require the use of more than one branch metric function to determine branch metric values, yet there is no disclosure of using different branch metric functions in a single detector.

In addition, the specifications of the CMU patents each describe the "variance dependent" branch metric function (Eqn. 10) and "correlation-sensitive" branch metric function (Eqn. 13) as a "metric" in the singular, not the plural:

> The corresponding branch metric is:
>
> $$M_i = \log\sigma_i^2 + \frac{N_i^2}{\sigma_i^2} = \log\sigma_i^2 + \frac{(r_i - m_i)^2}{\sigma_i^2} \qquad (10)$$

'839 patent at col. 6, ln. 13.

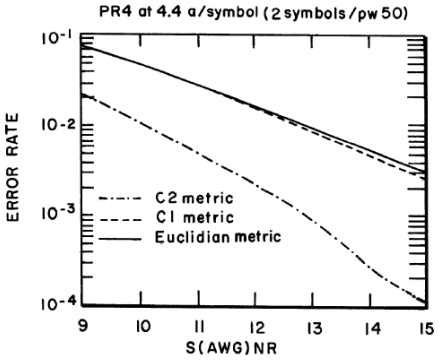
With this notation, the general correlation-sensitive metric is:

$$M_i = \log \det \frac{C_i}{\det\ c_i} + \underline{N}_i^T C_i^{-1} \underline{N}_i - \underline{n}_i^T c_i^{-1} \underline{n}_i \qquad (13)$$

'839 patent at col. 6, ln. 66 to col. 7, ln. 3.

If either of the above branch metric Equations 10 or 13 were a "set" of branch metric functions (as opposed to just a "single" branch metric function), then to convey with reasonable clarity that there was a set of functions to select from the named inventors would have described these equations as "metrics" in the plural. Proakis Decl. at ¶ 52. Therefore, under the express terms of the specification and the construction by the Court of the word "function," these equations are a "single" branch metric and function as described by the named inventors themselves.

This use of "metric" in the singular and not the plural is consistent throughout the specification to refer to a single branch metric function. For example, in connection with Figures 7-13 of the CMU patents, whenever the named inventors employed the "correlation-sensitive" branch metric (Eqn. 13), they still referred to the function as a "metric" in the singular (i.e., the "C2 metric") and not "metrics" in the plural (i.e., "C2 metrics"). Proakis Decl. at ¶ 53. For example, Figure 7 is below:



Even though the signal to noise ratio (SNR) varies across the lower horizontal axis from the left to right, the figure makes clear that only a single branch metric function was used by referring to the "C2 metric" (which corresponds to Eqn. 13). *Id.* Stated differently, even when the variables are varied in Eqn. 13, the specification of the CMU patents still refer to the branch metric function as a single "C2 metric" not a set of different metrics. *Id.* This is consistent with the "correlation-sensitive" branch metric equation (Eqn. 13) being a single function and not a set of functions, as construed by the Court. *Id.*

Accordingly, because the CMU patents do not disclose any "set" of different branch metric functions for use in a Viterbi detector, the Group I claims fail to comply with the written description requirement set forth in 35 U.S.C. § 112, ¶ 1 and are necessarily invalid.

B. The CMU Patent Specifications Do Not Describe Any Viterbi Detector That Uses The Particular "Selecting" Step Recited In The Group I Claims

As a separate and independent ground for why the Group I Claims are necessarily invalid under the written description requirement, the CMU patents also fail to disclose the particular "selecting" step recited in the Group I Claims. Proakis Decl. at ¶¶ 20 and 54-55. In order to ***select*** one branch metric function from a set of more than one, there must be disclosure of some method of implementation for that step in the hardware of a Viterbi detector. However, there is no disclosure or description of any hardware or design that performs such a selecting step. Proakis Decl. at ¶¶ 54-55. Figure 3A, despite being described as a "branch metric computation circuit 48 that computes the metric M_i for a branch of a trellis, as in Equation 13" does not describe how to "select" a branch metric function. '839 patent at col. 7:10-12. *Id.* Likewise, Fig. 3B of the '839 patent specification is described as an "implementation of a portion of the branch metric computation module of Fig. 3A," but does not disclose any selection criteria or other description of what "selecting" means. '839 patent at col. 2:46-48. *Id.* Both of those figures

help describe the implementation of a single "correlation-sensitive" branch metric function (Eqn. 13, M_i) in a detector. Even though the branch metric function M_i includes variables such as target values and noise statistics that vary from branch to branch (as in Worstell's detector) those variables do not convert the single branch metric function M_i into a set of branch metric functions, as the Court has already ruled. *Id.* Accordingly, those figures do not disclose or describe any teaching of a "selecting" step. *Id.*

Furthermore, there is no disclosure of how a person of ordinary skill in the art would select which particular function to use in a detector, for a given branch of a trellis, if different functions were in fact contemplated. Indeed, the word "select," its synonym "choose," or any other analogue does not appear anywhere in the Detailed Description of the Invention portion of the CMU patent specifications. Proakis Decl. at ¶ 65. Without a specification that describes what the selection criteria would be, the claims are invalid for failure to satisfy the written description requirement. Because the CMU patents do not disclose any Viterbi detectors that use more than one branch metric function, there is also no disclosure of any step or circuit for selecting a particular branch metric function from a set of different branch metric functions. For example, two figures in particular would be expected to disclose the claimed "selecting" step if there where support anywhere in the patent for such step. Proakis Decl. at ¶ 55(b). Figure 6 is described as "illustrating a flowchart of a method of detecting a sequence of adjacent signal samples stored on a high density magnetic recording device" and Figure 2 of the CMU patents illustrates a "block diagram of a [correlation-sensitive] detector circuit 28." '839 Patent at col. 11:11-14 and col. 3:30. However, both of those figures are missing any reference to CMU's claimed "selecting" step. In particular, Figure 6 describes a method that goes directly from "UPDATING NOISE COVARIANCE MATRICES" (step 44) to "CALCULATE BRANCH

METRICS" (step 46) without "selecting" a branch metric function or giving any indication that the named inventors had possession of such feature. *Id.* The claimed step is simply missing from CMU's disclosure as if it never existed. *Id.* Similarly, Figure 2, although including circuitry for tracking noise statistics (block 34) and "metric computation update" (block 36), fails to illustrate any circuitry for "selecting" a branch metric function, again as if the step never existed. *Id.*

In addition, there is no disclosure in the CMU specifications of a detector where the "variance dependent" branch metric function (Eqn. 10) is combined with the "correlation-sensitive" branch metric function (Eqn. 13) to form the presumed "set" of branch metric functions from which the "selecting" step of the Group I Claims is to select. Proakis Decl. at ¶ 45. Indeed, such a combination would make no sense on its face because the "variance-dependent" branch metric function (Eqn. 10) does not depend on a "plurality of signal samples" and cannot be used to satisfy the subsequent "applying" step of the Group I Claims. *Id*. Accordingly, such a combination to form a "set of functions" would not fall within the scope of the Group I Claims. *Id.*

As explained below, there is a ***likely*** explanation as to why the specification of the CMU patents does not disclose a detector that uses a plurality of different branch metric functions, as required by the Group I Claims. This is because the Groups I Claims were added to the specification a year after filing the original provisional application. In addition, the Group I Claims in the '839 patent were amended during prosecution to distinguish the prior art based an alleged distinction not supported by the specification.

C. The Amendment of the Group I Claims During Prosecution Impermissibly Expanded the Scope of the Claims Beyond that Described or Supported by the Specification

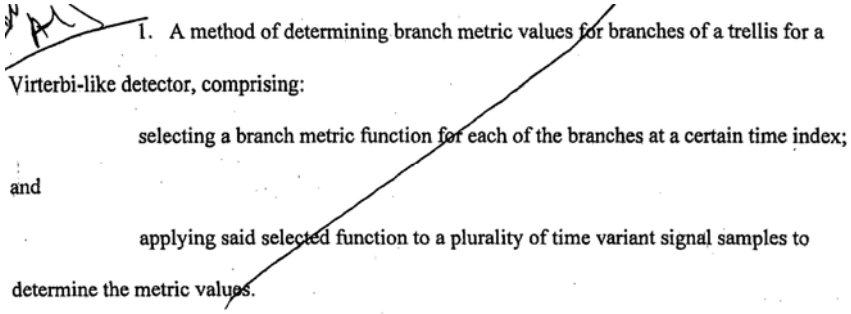
As described by the Federal Circuit in *Turbocare*, when an "applicant adds a claim or otherwise amends his specification after the original filing date, . . . the new claims or other added material must find support in the original specification" to satisfy the written description requirement of 35 U.S.C. § 112, ¶ 1. The amendment history of the Group I claims shows that CMU did not originally disclose the use of multiple branch metric functions in a detector, but later attempted to claim such use.

CMU filed its provisional patent application with the Patent Office on May 9, 1997. (Ex. 1; Ex. 2.) Both of the CMU patents claim priority to this provisional application. (See Ex. 1; Ex. 2.) This provisional application did not include the Group I Claims having the subject "selecting" step. (Ex. 4; Stmt. of Facts) Indeed, the application never once refers to a "branch metric function," let alone a set of "branch metric functions" (in the plural) or a step of "selecting" one function from a set. (Ex. 4)Indeed, the verb "select" does not appear anywhere in the application including the Abstract and claims.

On April 3, 1998, CMU followed up on their provisional application by filing a formal utility patent application, which claimed priority to the earlier-filed provisional application. (Ex. 5) This utility application first introduced the claims that eventually issued as the Group I Claims. (Ex. 5) The portion of the specification describing the "variance dependent" branch metric (Eqn. 10) and "correlation sensitive" branch metric (Eqn. 13), set forth at column 6, line 9 through column 7, line 5 of the '839 patent, was not amended or altered at all. (Exs. 1, 4 and 5) In fact, other than in the claims and the Abstract of the application, the specification contains no references whatsoever to "selecting" a "branch metric function" from a set of "branch metric functions." Indeed, the words and phrases "select," "choose," "selecting," "choosing," "branch

metric function" or "branch metric functions" do not appear anywhere in the Detailed Description of the Invention portion of the CMU patent specifications. Proakis Decl. at ¶ 65.

When CMU filed its formal utility patent application introducing the Group I Claims for the first time in April 1998, they were directed to using a **single** branch metric function for calculating a **plurality** of branch metrics at a certain time index in the trellis:



1. A method of determining branch metric values for branches of a trellis for a Virterbi-like detector, comprising:

selecting a branch metric function for each of the branches at a certain time index; and

applying said selected function to a plurality of time variant signal samples to determine the metric values.

Ex. 5, Application, (filed April 3, 1998) at 25.

This proposed claim only referred to a single branch metric function which is used to determine a plurality of branch metric values. Proakis Decl. at ¶¶ 57-59. Accordingly, as originally drafted, claim 1 was directed to a ***different*** method than the one at issue here. In particular, the original claimed method used a single branch metric function across the different branches of the trellis to determine the various branch metric values associated with those different branches. *Id.*

In the 1st Office Action, the Group 1 Claims were rejected over the Fitzpatrick patent. (Ex. 6 at 2-3). In response to that rejection, CMU amended claim 1 to change "function" in the singular to "functions" in the plural; and "values" in the plural to "value" in the singular:

1. (Amended) A method of determining branch metric values for branches of a trellis for a Virterbi-like detector, comprising:

selecting a branch metric function for each of the branches at a certain time index; and

applying each of said selected [function] functions to a plurality of [time variant] signal samples to determine the metric [values] value corresponding to the branch for which the applied branch metric function was selected, wherein each sample corresponds to a different sampling time instant.

Ex. 7, Amendment, (dated June 12, 2000) at 2.

This amendment **expanded** the scope of the claim to require that different functions be used on different branches of the trellis at a given time index to calculate the metric value for each branch. Proakis Decl. at ¶¶ 60-62. At the time this amendment was made, CMU did not amend the specification to refer to Equation 13 as a "set" of branch metric equations (or functions), or make any other amendments to add a reference to a second (correlation-sensitive) branch metric function different than branch metric function Equation 13 so as to have a set to chose from. Proakis Decl. at ¶ 61. This amendment, therefore, impermissibly added new matter. Proakis Decl. at ¶ 62.

Without amending the specification to show that there was more than one branch metric function used in the detector, the named inventors could not show that they were in possession of the claimed invention. As such, the Group I Claims are invalid for failing to comply with the written description requirement of 35 U.S.C. § 112, ¶ 1, as further evidenced by the prosecution history.

D. The Invalidity of the Group I Claims Is Appropriate to Resolve on Summary Judgment

Although the written description requirement is a question of fact, the Group I Claims are amenable to resolution on summary judgment. The parties do not contest that "select" refers to "to choose one from a set of more than one." Dkt. No. 120-1 at 3. There is no genuine dispute that this "selecting" step is not supported by the specification. The Federal Circuit has invalidated patent claims on the basis of an uncontested claim construction where the specification simply did not disclose the claim as it was construed. *PIN/NIP, Inc. v. Platte Chem. Co.*, 304 F.3d 1235, 1247-48 (Fed. Cir. 2002). In *PIN/NIP*, the Federal Circuit invalidated claims directed, under the uncontested construction, to the sequential application of two chemicals, when the specification only disclosed a mixture of the two chemicals. Id. Likewise, the Court here has already construed the claim term "function." Moreover, CMU has stated that it does not contest the Court's order in any way. Dkt. No. 312, at 5, n.5 ("[I]t is unnecessary to reconsider or change the Memorandum."). The Court's construction inexorably leads to the conclusion that the claimed step of "selecting a branch metric function" for use in a Viterbi detector to determine branch metric values is just not disclosed in the specification because the specification only discloses the use of a single function at a time. As such, the Group I claims are invalid under 35 U.S.C. § 112, ¶ 1 for failing to comply with the written description requirement, just as was previously the case for CMU's claims in the *Hoffman La Roche* case.

E. Under the Court's Construction of the "Selecting" Step, Including the Term "Function," to be Consistent With Its Prior Ruling, the Court Must Conclude That a Detector That Uses CMU's "Correlation-Sensitive" Branch Metric (Equation 13) Does Not Practice the Group I Claims

Under the Court's interpretation, Worstell's "further modified" metric is a single branch metric function. Proakis Decl. at ¶¶ 24-37. There is no genuine dispute that Worstell's "further modified" metric is a function of four variables: (1) the present signal sample; (2) the present

target values; (3) prior (historical) noise terms; and (4) noise statistics (including the transition noise standard deviation). *Id*. at ¶ 33. The Court held that Worstell's branch metric was a "single" function, stating that, "simply adding another variable into a function – here the target value – does not operate to convert that single function into multiple functions." Dkt. No. 306 at 16.

Likewise, the "correlation-sensitive" branch metric (Eqn. 13) of the CMU patents must be a "single" branch metric function. Proakis Decl. at ¶¶ 46-49. This metric (Eqn. 13) depends on the same four types of variables: (1) the present signal sample; (2) the present target values; (3) the prior (historical) noise terms; and (4) noise statistics (including the covariance matrix C_i, which depends upon the transition noise standard deviation). *Id*. at ¶ 47-49. The first three variables above are identical to those in Worstell's "further modified" branch metric. *Id.* at ¶ 49. The fourth variable, noise statistics, although not identical, are related. Although the covariance matrix C_i in Eqn. 13 is more complex, it includes a component that depends upon the "transition noise standard deviation" variable used in Worstell's metric. *Id*.

Accordingly, to be consistent with its prior ruling, the Court must conclude that a detector that uses CMU's "correlation-sensitive" branch metric (Eqn. 13) does not practice the Group I Claims. Therefore, under CMU's logic already adopted by the Court, the CMU patents fail to comply with the written description requirement set forth in 35 U.S.C. § 112, ¶ 1, because of the lack of any disclosure in the specification of the particular methods covered by the Group I Claims.

As explained below, to the extent CMU asserts the Group I Claims cover a Viterbi detector that uses the "correlation-sensitive" branch metric (Eqn. 13), they would necessarily be invalid under 35 U.S.C. § 102 based on the Worstell patent. Accordingly, for the Court to be

consistent, it would either have to find the Group I Claims invalid for failing to comply with the written description requirement (see above) or, in the alternative, being anticipated by the Worstell patent (see next section below). Either way, the claims should be dismissed from this law suit for being invalid.

F. CMU's Assertion That The Group I Claims Cover A Viterbi Detector That Uses The "Correlation-Sensitive" Branch Metric (Eqn. 13) Would Render the Claims Invalid As Being Anticipated By the Worstell Patent

Marvell anticipates that CMU will argue that a Viterbi-like detector using the "correlation-sensitive" branch metric (Eqn. 13) described in the CMU patents practices the method recited in the Group I Claims, including the step of "selecting" a branch metric function from a set of different functions. In the event that CMU does, the same argument should be applied to the detector disclosed in the Worstell patent for purposes of anticipation under 35 U.S.C. § 102. Both the Worstell and CMU detectors take correlated noise and signal-dependent noise into account by simply providing a modified branch metric for use in an otherwise "conventional" Viterbi detector that selects the most likely path through a trellis. Proakis Decl. at ¶ 66. Both metrics are a function of the same four types of variables. Id. at at ¶ 49..

In light of the above, to the extent that CMU argues that the Group I Claims cover CMU's detector using its "correlation-sensitive" branch metric (Eqn. 13), consistency demands that they also cover Worstell's detector using its "further modified" metric. The Court should therefore hold the Group I Claims invalid under 35 U.S.C. § 102 as being anticipated by the Worstell patent. *See* Marvell's briefing on its prior summary judgment motion, along with the Court's Memo. Op. (Dkt. No. 306), which are hereby incorporated by reference. CMU cannot point to any distinction between the operation of the Worstell detector using the "further modified" metric and CMU's detector using the "correlation-sensitive" branch metric (Eqn. 13) **relevant** to the instant claims. Proakis Decl. at ¶¶ 66-67. Both detectors take correlation and

signal-dependent noise into account using the same types of four variables. CMU's branch metric (Eqn. 13) may be more complicated because it requires the use of matrix mathematics, but that distinction is not relevant to any claim requirement set forth in the Group I claims.

G. Based On A Lack of Any Disclosure of the Words "Function," "Functions," "Select" and "Selecting" in the Specification of the CMU Patents (Other Than The Subject Claims and Abstract), The Claims are Invalid For Being Indefinite.

Lastly, the Group I Claims are invalid under 35 U.S.C. § 112, ¶ 2 because the "selecting" step is indefinite in light of the lack of any reference in the specification to the key terms that encompass that limitation. The definiteness requirement focuses on whether the claims, as interpreted in view of the claim language, the specification, the prosecution history, and the knowledge in the relevant art, by one of ordinary skill in the art, adequately perform their function of notifying the public of the scope of the patentee's right to exclude. *Haemonetics Corp. v. Baxter Healthcare Corp.*, 607 F.3d 776, 783 (Fed. Cir. 2010). Where the specification omits a key method related to a claim term, the claims are indefinite. *Honeywell Int'l, Inc. v. In'l Trade Comm'n*, 341 F.3d 1332 (Fed. Cir. 2003) (invalidating claims that explicitly define a mathematical requirement in the claims, but do not specify how to measure that figure). The specification of the CMU patent does not properly disclose the meaning of the word "function," "functions," "select" and "selecting" in the context of a Viterbi-like detector, leaving the public to guess as to what the claims cover and do not cover. Moreover, CMU has put forth varying interpretations of the scope of its own claims in this case, in its infringement contentions and in opposition to the previous motion for summary judgment. Without clear explanation in the specification of what these terms mean, especially given the high level of skill in the art, the Group I Claims should also be held invalid under 35 U.S.C. § 112, ¶ 2. As CMU has effectively admitted, the claims are vague and unclear enough that they can be interpreted one way for its

infringement case (*see* Dkt. No. 249, Marvell SJ Reply Brf. at 5-6; Dkt. No. 251-3, CMU Infringement Contentions at 1; Dkt. No. 251-2, Moura Dep. at 185:2-5), another way for trying to distinguish the prior art (see CMU's briefing on the earlier motion) and yet a third way for trying to argue compliance with the written description requirement. As such, the Group I Claims should also be held invalid under 35 U.S.C. § 112, ¶ 2. *Allen En'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1349 (Fed. Cir. 2002) ("Where it would be apparent to one of skill in the art, based on the specification, that the invention set forth in a claim is not what the patentee regarded as his invention, we must hold that claim invalid under § 112, paragraph 2.").

V. CONCLUSION

There is no genuine dispute of material fact that the Group I Claims of the are invalid under the written description requirement of 35 U.S.C. § 112, ¶ 1. Based on CMU's arguments already on the on record and anticipated to be argued in opposition to this motion, the claims are also invalid under 35 U.S.C. § 102 as being anticipated by the Worstell patent. Lastly, the Group I Claims are invalid under 35 U.S.C. § 112, ¶ 2 because the "selecting" step is indefinite.

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Respectfully submitted,

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